

ANESTHETIC MANAGEMENT OF A PATIENT WITH CENTRAL AIRWAY COMPRESSION DUE TO POSTERIOR MEDIASTINAL MASS

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SUMMARY – Patients with mediastinal masses present unique challenge to anesthesiologists. Patients with anterior mediastinal masses have well documented cases of respiratory or cardiovascular collapse during anesthesia and in postoperative period. Masses in the posterior mediastinum have been traditionally regarded to carry a significantly lower risk of anesthesia related complications but cases of near fatal cardiorespiratory complications have been reported. We describe anesthetic management of a patient with posterior mediastinal mass compressing the trachea and the left main bronchus presented for left thoracotomy and tumor excision. The patient experienced pain and cough, and exhibited positional dyspnea. Airway was successfully secured with awake nasotracheal intubation and placement of single lumen endobronchial tube.

Key Words: *Mediastinal Neoplasms – Complications; Airway Obstruction; Airway Management; Bronchoscopy; Case Reports*

Introduction

The literature is focused mostly on anesthetic management of patients with anterior mediastinal masses, which have well documented cases of respiratory or cardiovascular collapse during anesthesia and in postoperative period¹. Masses in the posterior mediastinum have been regarded to carry a significantly lower risk. However, there are reports of near fatal cardiorespiratory complications during management of patients with masses in the posterior mediastinum¹⁻³. We describe anesthetic management of a patient with posterior mediastinal mass compressing the lower trachea and the left main bronchus presented for left thoracotomy and tumor excision. The patient experienced pain and cough, and exhibited positional dyspnea. Airway was successfully managed

with awake nasotracheal intubation and placement of single lumen endobronchial tube (SLEBT).

Case Report

A 36-year-old woman with posterior mediastinal mass presented for left thoracotomy and excision of tumor. The patient had good nutritional status and was previously healthy. For the last 2 months, she had dry cough and felt pain under the right costal arch that irradiated towards the right scapula. She was unable to sleep in supine position due to dyspnea. Her breath sounds were normal and her blood pressure was 130/80 mm Hg. In supine position, she experienced dyspnea that she could tolerate for a short period. Her symptoms were similar in the left and right lateral position. Laboratory findings were within the normal limits.

Contrast enhanced computed tomography (CT) scan showed a homogeneous, well defined mass, 8.1 cm x 7.5 cm x 5.3 cm in size, in the posterior medi-

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Fig. 1. Transverse section of computed tomography scan showing posterior mediastinal mass compressing and displacing the trachea anteriorly and to the right.

astinum that shifted the trachea anteriorly and to the right and exerted compression on the posterior tracheal wall narrowing tracheal diameter to 50% at the point of maximal compression (Fig. 1). The left main bronchus was also compressed and bronchial diameter reduced to 35% of normal (Fig. 2).

Fiberoptic bronchoscopy revealed significant extraluminal compression of the trachea (Fig. 3) and the



Fig. 2. Coronal section of computed tomography scan showing posterior mediastinal mass compressing the trachea and the left main bronchus.



Fig. 3. Bronchoscopy image showing extraluminal compression on the posterior tracheal wall.

left main bronchus (Fig. 4). Spirometry performed in upright position was within the normal limits. Since our patient experienced positional dyspnea with significant compression of the trachea and the left main bronchus, our plan was to perform awake nasotracheal fiberoptic intubation.

On the morning of surgery, the patient was transferred to the operating room in sitting position. Standard monitors were applied and the patient was premedicated with 1 mg of midazolam. Epidural catheter



Fig. 4. Bronchoscopy image at the level of tracheal carina showing patent right main bronchus and almost complete obstruction of the left main bronchus.

was placed on Th5/6 level for intra- and postoperative analgesia without difficulties. Right radial artery was cannulated for invasive blood pressure monitoring. Rigid bronchoscope and thoracic surgeon were available in the operating room. Both nostrils were prepared for nasal intubation with ephedrine solution and 2% lidocaine gel. Additional 2% lidocaine solution was applied through a narrow catheter positioned in the nasopharynx. Right-sided single lumen endobronchial tube, 6.5 mm internal diameter, 45 cm in length (Rush, Teleflex Medical, Wayne, Pennsylvania, USA) was coupled with fiberoptic bronchoscope LF-GP with outer diameter 4.1 mm (Olympus, Tokyo, Japan). Endobronchial tube was positioned at a depth of 13 cm in the right nostril and bronchoscope was passed through the tube. Additional 2% lidocaine solution was applied on the aditus. On advancing the bronchoscope, the compressed segment of the trachea was visualized. The right bronchus was patent but there was almost complete occlusion of the left main bronchus. Endobronchial tube was passed over the bronchoscope beyond tracheal narrowing at the level just above the carina without difficulties. Propofol and fentanyl were given and sevoflurane was started. The patient was breathing spontaneously. She was turned in supine position and with increasing depth of anesthesia manually assisted ventilation was applied. Bronchoscopy was performed again to position the tube in the right main bronchus. After turning the patient in lateral decubitus position, the tube was rechecked and tracheal cuff was briefly released to allow collapse of the lung on the operated side. Anesthesia was maintained with sevoflurane and fentanyl. During preparation for surgery, arterial pressure dropped to 90/60 mm Hg and the patient received 4 mg of etilefrine. Fifteen minutes after beginning of the surgery, pressure controlled ventilation was initiated without difficulties and a bolus dose of rocuronium was administered. Sevoflurane was reduced and the patient remained hemodynamically stable thereafter. The patient was extubated in the operating room and transferred to the Intensive Care Unit. Histopathologic diagnosis was bronchogenic cyst.

Discussion

Literature reports are focused mostly on management of patients with anterior mediastinal masses

while masses in the posterior mediastinum have been regarded to carry a significantly lower risk. However, there are reports of near fatal cardiorespiratory complications during management of patients with masses in the posterior mediastinum. Since mediastinal compartments are not bounded with firm boundaries, sufficient tumor growth anywhere within the mediastinum can cause significant compression of vital structures. Masses in the posterior mediastinum cause compression of the trachea, main bronchi, left atrium and left ventricle. Posterior tracheal wall due to its membranous structure can be especially prone to external compression¹. Respiratory and cardiovascular decompensation requiring urgent cardiopulmonary bypass due to posterior mediastinal mass has been reported². Patients with mediastinal masses need very meticulous preoperative assessment and planning. Dyspnea, cough and syncope, especially when changing position from upright to supine, are very significant symptoms. Position that is most comfortable for the patient must be determined preoperatively. Serious complications are reported in patients with unremarkable history and clinical examination, so careful evaluation of CT scan is necessary, supplemented with fiberoptic bronchoscopy and echocardiography in selected cases^{1,4}. Patients with compression of major airways are at an increased risk of respiratory complications during postoperative period as well^{3,6}.

Since our patient had positional dyspnea and significant compression of the trachea with associated bronchial compression, she was at an increased risk of perioperative airway decompensation¹. For patients with central airway obstruction, the safest option is securing distal airway with awake fiberoptic intubation and placement of endotracheal tube distal to tracheal obstruction.

If general anesthesia is indicated, volatile or intravenous induction is performed with preservation of spontaneous breathing. The use of muscle relaxants should be avoided but if positive pressure ventilation is possible without significant increase in airway pressures, they can be given. If respiratory decompensation ensues intraoperatively, rigid bronchoscopy may be necessary for ventilation. In the event of respiratory or cardiovascular collapse, changing patient position to the most comfortable one as determined preoperatively can lead to improvement⁴.

Airway collapse despite spontaneous ventilation has been reported in patients with anterior mediastinal mass with airway compression beyond the tip of the endotracheal tube⁷.

Besides securing airway beyond the compressed tracheal segment, lung isolation was required for planned thoracotomy and excision of tumor. Recommended technique for lung isolation in patients with predicted difficult airway is awake orotracheal or nasotracheal intubation followed by placing a bronchial blocker (BB) or replacing single lumen tracheal tube for double lumen tracheal tube over the airway exchange catheter after induction of general anesthesia. Lung isolation with endobronchial placement of single lumen tracheal tube is rarely performed^{8,9}. Nasotracheal intubation was selected for our patient because it usually enables easier glottic visualization and smoother tube passage into the trachea with less breath holding, which is especially undesirable in patients with central airway obstruction. A tube long enough to enable nasotracheal intubation and positioning of the tip distally to the compressed tracheal segment was required, so SLEBT was selected.

Single lumen endobronchial tubes are double cuffed single lumen tubes adjusted for left- or right-sided bronchial intubation. They were used in the past for lung separation but they were substituted with double lumen tubes and bronchial blockers in modern thoracic anesthesia. However, SLEBT can have role in particular clinical settings for airway management in the surgery of distal trachea and main bronchi and for lung separation in obese patients¹⁰. Modified SLEBT was successfully used for airway management in severe tracheobronchial compression¹¹. Also, when dealing with difficult airway in emergency, SLEBT could be easier to place than double lumen tube and protect the lung more safely than BB because it is less prone to dislodgement¹². For our patient, advantage of SLEBT compared with double lumen tube was smaller outer diameter that allowed smooth awake nasal intubation and passage through the significantly narrowed trachea. Compared to single lumen tube with BB, the advantage of SLEBT was sufficient length that allowed nasotracheal intubation with reliable positioning of the tip of the tube distally to tracheal obstruction.

Conclusion

For symptomatic patients with central airway obstruction due to posterior mediastinal mass, the safest option for airway management is awake fiberoptic intubation and placement of endotracheal tube distally to tracheal obstruction. Single lumen endobronchial tube can be used in a particular clinical setting for managing lung separation in patients with difficult airway.

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Sažetak

ANESTEZIOLOŠKI POSTUPAK KOD BOLESNIKA S KOMPRESIJOM SREDIŠNJEGA DIŠNOG PUTA
ZBOG MASE U STRAŽNJEM MEDIJASTINUMU*N. Sulen, B. Petani, I. Bačić i D. Morović*

Bolesnici s masama u medijastinumu predstavljaju jedinstven izazov za anesteziologe. U literaturi se uglavnom govori o anesteziološkim postupcima kod bolesnika s masama u prednjem medijastinumu za koje postoje brojni dobro dokumentirani slučajevi respiracijskog i kardiovaskularnog kolapsa tijekom anestezije i u poslijeoperacijskom razdoblju. Smatra se da mase u stražnjem medijastinumu imaju značajno manji rizik vezan za anesteziju, ali su i kod ovih bolesnika opisani slučajevi teških perioperacijskih kardiorespiracijskih komplikacija. Prikazan je anesteziološki postupak kod bolesnice s tumorom u stražnjem medijastinumu koji je uzrokovao kompresiju traheje i lijevog glavnog bronha, predviđene za torakotomiju i eksciziju tumora. Bolesnica je imala simptome kašlja, bolova i dispneje u ležećem položaju. Dišni put je uspješno osiguran nazotrahealnom intubacijom budne bolesnice i postavljanjem jednoluminalnog endobronhalnog tubusa.

Ključne riječi: *Medijastinalni tumori – komplikacije; Dišni put, opstrukcija; Dišni put, zbrinjavanje; Bronhoskopija; Prikazi slučaja*